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An Inaugural Essay
on
Pertussis
for
The Degree
of
Doctor of Medicine
in the
University of Pennsylvania
by
Charles H. Bennett
of Pennsylvania
Philadelphia
January 2nd 1828.

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Pertussis.

The disease which I am about to describe, is one that has not been much attended to, perhaps for this reason alone, that nine-tenths of the cases recover. A large portion of the deaths, recorded in the bills of mortality, under the names of marasmus, hydrocephalus, phthisis, and some others are occasioned primarily by it. The number of deaths in the bills of mortality of this city in 1826 was 43-23 of which were under one year old. Therefore it requires a share of notice among the many diseases which our species are liable to receive. By Dr Cullen it is ranked in the class Neuroses, and order Spasmi. By Good in class 2 ond. Pneumatica, order second Pneumonica, Genus first Bex, Species third Convulsiva. By the Greeks this disease was denominated, Bex Thnioides, which the Latins translated literally Tussis Ferina, wild or untameable, cough, "from its violence. The name of

Pertussis is derived from per much and tussis cough. Our own name of Hooping-cough is derived from the convulsive clangour which accompanies the fit. The name of Kincough by which it is distinguished in the North of Europe and which should rather be written kind-"a child," as being peculiar to this age, nevertheless it occurs in advanced life.

Dr Cullen says this cough is commonly epidemic, and manifestly contagious, attacking all the children of a neighbourhood into which it has been introduced, affecting some more than others. The remote cause of hooping-cough is often difficult to trace. Frequently, indeed, like common cough it seems to proceede from some irritability of the stomach or some peculiar affection of the lungs. By Linnaeus who at one period of his life endeavoured to resolve almost all diseases into animalicular origin, taught that Hooping-cough was also produced in the same way by an insect of a peculiar kind.

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It rarely attacks more than once in a man's life. And from all these circumstances there can be little doubt that it proceeds, in most instances from a miasm of a specific nature and peculiar quality; which like those of the influenza or epidemic catarrh, and the measels has direct determination to the lungs; though it is not, like these contagions essentially linked with fever. The proximate or immediate cause seems to be a viscid matter or phlegm lodged about the bronchia, trachea, and fauces.

Symptoms, It begins with the common symptom of catarrh, from which indeed it cannot be distinguished by any known criterion for the first week. It has been observed, that the usual catarrhal symptoms are here accompanied with a more than ordinary disposition to sleep, and those which denote general fever are seldom very strongly marked. About the end of the second or beginning of the third week, the symptoms undergo a remarkable change; the fever declines, and appetite returns; but the cough continues, and occurs in paroxysms

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of extraordinary violence. The child struggles for breath, and appears in great danger of suffocation until relieved by the long and full inspiration known under the name of the back draught or hoop. The excretion is at first small in quantity, but afterwards more copious, though always viscid. The hoop is often accompanied with a rejection of the contents of the stomach, and occasionally by bleeding at the nose on an epileptic paroxysm, sometimes ecchymosis about the eye, and the whole system during the paroxysm suffers great violence. The face is turgid and purple from suffusion and the eyeballs swollen and prominent. The little patient with a forewarning of the attack, falls on his knees at the time or clings to any thing near him. Yet the violence is instantly forgotten; and after deeply panting for breath, he returns with as much eagerness as ever to his play or other pursuit; while the vomiting which is generally a good sign, is succeeded by a craving for fresh food. Dr Percivat, relates a singular case, which occured daily at a certain hour, attended,

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with a tremor of the whole body: the fit terminating by a shriek rather than a hoop. The complaint was obstinate for several months, and returned at the same season for two years. It yielded to no medicines, and was supposed to depend on some morbid condition of the liver. The fits vary much in frequency. In mild cases they do not occur more than three or four times a day. In severe ones they harass the patient every half hour. It is very rare to find them occurring at regular intervals. They are often brought on by exertions of body or emotions of mind. Whatsoever hurries the circulation, seems to excite the paroxysm as long as the disease is contagious. It is common therefore to find the child averse from speaking or moving. Whatever occupies the mind powerfully, (to the entire seclusion of other impressions) will procrastinate the paroxysm, unless it excite the action of the heart. The dread of corporeal castigation has prevented the recurrence of the fits in children, 'till they discovered the object of the threat. A greater degree of fear which pos-

upset the mind so entirely as to extinguish all hope of temporal salvation has cured the disease. Dr Potter relates the cases of two children, the one aged seven, the other ten years and six months old, were rescued from a house in flames, a few minutes before the roof fell in. The elder was in a state of syncope, and the other was lying on the floor nearly exhausted, speechless and incapable of motion. The elder did not cough afterwards, nor discover any symptom of the disease, but convalesced rapidly, the younger coughed twice on the succeeding day, and from that time gradually recovered without any sign of bronchial or pulmonary disease. The elder had laboured under pertussis about fourteen, and the younger about seventeen days. When once the disease has assumed its regular form, the appetite is good, and this is strikingly displayed in the craving for food, which comes on when the fit terminates by vomiting. The tongue is always clean and moist. There is no difficulty of breathing in the intervals of the fit.

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Permanent dyspnoea betokens more than mere hooping-cough, - probably an inflammatory condition of the bronchial membrane. The bowels are seldom affected. It will be necessary however in children to pay particular attention to the bowels, especially in the summer as in that season we generally find most of their complaints attended with a vitiated state, and sometimes the most urgent symptoms will yield to cathartics or other medicines which tend to bring them to their natural state. It is very common to find children complaining of a tensive pain of the forehead in hooping-cough, and in severe cases this is obviously an urgent symptom, and one which demands attention in reference to practice. ~~to practice~~ The further progress and duration of hooping-cough are subject to great variety. In the mildest form it generally lasts two or three months, and when severe, is often protracted to eight or ten. Even in mild cases after it has wholly ceased, or nearly so, an accidental exposure to cold

has occasioned its return. Under the most favourable circumstances the decline of the disease is very gradual, and almost imperceptible. It happens, however, but too frequently, that the latter stages of the disease are attended with a formidable train of evils. In some cases a convulsive fit occurs in one of the paroxysms, the blood rushing in upon the brain carries off the patient when the practitioner is least prepared for it. In other cases, from exposure to cold, pneumonic symptoms supervene, and the child either dies with his lungs gorged with blood, or the foundation is laid for a species of infantile phthisis. In a third set of cases, hooping-cough brings on genuine hydrocephalus, and the child dies in a state of coma. But of all the modes by which hooping-cough proves fatal, the most common is that by marasmus and infantile fever. The child after a continuance of the disease for a certain time, from causes not well understood, loses his appetite, emaciates rapidly, becomes hectic, and dies apparently

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Favourable symptoms:— a moist skin, warm extremities, open bowels, plentiful expectoration, and free vomiting. The danger is not proportioned to the age of the patient, a child of two or three months old will struggle through the complaint as well as another of two or three years. When it attacks weakly or scrofulous children, or those labouring under some other disease, it is apt to prove severe, tedious, and therefore dangerous. When hooping cough begins late in the spring, it is commonly milder than when its approach is towards the beginning of winter. It is always most destructive in cold climates, and in cold and damp seasons.

Different opinions have been entertained regarding the precise nature of hooping-cough. It was originally considered as a spasmodic disease, allied in its more obvious features to asthma and chorea, but acknowledging also many of the laws of convulsive diseases generally. This simple and very satisfactory explanation of the pathology of hooping-cough has latterly been called in question; and it has been confidently main-

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tained that it is an affection of an inflammatory kind, closely allied to the ordinary varieties of bronchitis. In favour of this opinion it has been argued; firstly, that common winter cough frequently shows a strong disposition to spasmodic exacerbation; secondly, that all the more important sequelæ of hooping-cough are of a decidedly inflammatory character, and thirdly, that inflammatory affections of another mucous membrane (catarrh and cynanche maligna) are induced by the operation of a specific contagion. To these arguments it may be replied, that they point out a strong tendency in this disease to inflammation, which the practitioner will do well to keep constantly in view; but an impartial observer will not fail to appreciate those more numerous considerations which associate it with the class of spasmodic diseases.

Diagnosis. It may be confounded with croup and convulsive catarrh. Dissections usually show the consequences of the organs of respiration being affected, and particularly those parts which are the seat of catarrh. When the disease is long protracted, it

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is apt to degenerate into pulmonary consumption, asthma, or visceral obstructions, in which case the glands of the mesentery are found in a hard and enlarged state. Serous effusions within the ventricles of the brain has been observed by some and by others nothing preternatural has been detected in either of the three great cavities of the body.

Treatment. Dr Cullen, in laying down his treatment indulges in an ingenious, and I believe correct hypothesis, and divides the disease into two stages. The first consists of that part of it during which he supposes the contagion to be present and operative, which possibly may include the first three weeks; the second embraces the remainder of its duration. Throughout the former stage, our attention should be directed to whatever will moderate the influence of the contagious stimulus, retard the return of the convulsive paroxysms, and mitigate their violence. Bleeding, in severe cases, will usually be found necessary for this purpose; but it should be avoided except in severe cases, as spasmodic affections are often rather

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increased than diminished by the use of the lancet, and it will generally be found better to employ blisters as a substitute. The most effectual remedy is emetics; whose action tends equally to interrupt the return of the paroxysms, and to keep the lungs unloaded, by producing a determination towards the surface.

The food must be light, and costiveness carefully prevented; but no benefit seems to be derived from purging. In this manner, upon Dr Cullen's mode of treatment, we are to guide the patient through that part of the disease which we may rationally suppose to be kept up by the stimulus of contagion. In its latter part, or second stage, in which a morbid habit alone is in all probability, the irritative power, a different course is demanded. For we have now nothing more to do than oppose the spasmodic habit by an anti-spasmodic process. A sudden and violent emotion of the mind, as overwhelming terror, is well known to have had this effect; but such a remedy is not to be recommended, and hence different tribes of medicines have been resorted to, which may

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be arranged under the three divisions of sedatives, for the purpose of taking off the morbid irritability of the affected muscles; stimulants, for the purpose of local or general revulsion; tonics, for that of both local and general re-invigoration. The sedatives chiefly made use of or recommended have been opium, hyosciamus, belladonna, conium, ledum palustre, the moschate antispasmodics, and lead. Emetics were probably first employed from its being observed that vomiting is one of the common terminations of the paroxysms, and that children who vomit, commonly pass through the disease easily. There is a great difference, however, between natural vomiting and that which is the result of irritating medicines, more especially of tartar emetic, which has often been employed with this view. It will in fact be found in practice, that frequent emetics, from their tendency to weaken the stomach, are inadmissible, but from the occasional exhibition of a few grains of ipecacuanha, some benefit may reasonably be expected. Antimonial wine will be found to be extremely

valuable in cutting short the paroxysm. It may be given to a child two years old in the dose of a teaspoonful every fifteen minutes 'till it vomits. The compound Syrup of Squills answers the same purpose. When the disease has subsisted for any length of time, the mild narcotics are decidedly useful. Of these conium is best, and has been very generally employed since Dr Butler's strong recommendation of it. The best form to administer it, is the following.

Take Extract of Conium grij
" Sulphate of Magnesia ℥j
" Caraway Water — ℥v
" Syrup of Red poppy — ℥j

Mix. 30 drops to be taken 3 times a day.

Other practitioners have found advantage from hyoscyamus, the lactuca virosa, the supracetate of lead and opium. The annexed formula has proved exceedingly useful in many cases. Take of the inspissated juice of the Lactuca virosa ℈ss- Nitrate of potass ℈j: Compound powder of Tragacanth ℈j- Almond mixture ℥iv- Mix and take

a teaspoonful 3 times a day. Opium for the most part confines the bowels, and makes the child feverish. The belladonna has been employed on the continent of Europe by Hufeland, with great success; he administers the quantity of a quarter of a grain of the powdered root in a little sugar; given morning and evening to a child under one year: one half grain to those of two or three years; one and a half to those of five or six years; by continuing the dose, it may be gradually enlarged. The Rhus vernix comes also strongly recommended by many foreign writers of distinguished character, as a stimulant spasmodic of considerable power, and highly useful in the hooping cough. Dr Fraesnoi to whom we are chiefly indebted for our acquaintance with it, employed its leaves in the form of extract. Of this he dissolved four grains in four ounces of syrup, and gave a table spoonful every three hours to a child. He adds, that, by the time the whole of this mixture was taken, the cough generally abated, and in most instances, ceased altogether. In this manner he tells us he cured 42 children at Valenciennes in 1786.

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It is certainly a very active and pungent plant, and, when given in an over dose, is a severe poison. The vapour or aroma, that issues from its juice, will often excite inflammation in the eyes when held for a short time over it. Musk has been tried in all proportions and with all possible effects, from six grains to half a drachm at a time; but the effects it is stated to produce are so various, and indeed contradictory in different individuals, as to prevent confidence in its use. The accounts can only be reconciled by supposing, that in some habits it operates more beneficially than in others. The artificial musk, a spongy mass obtained by mixing nitrous acid with oil of amber, appears in every instance to have been as successful as the best and genuine musk from Thibet, and is hence well entitled to attention from its comparative cheapness. Lead has been employed in the form of Goulards well known extract. Prussic acid has been used in the form of cherry laurel water, for some time in Germany with great success. The stimulant plan, if it have not been

more successful than the sedative, has at least been as powerfully supported. Its intention is that of taking off the propensity to spasmodic action in the trachea, by exciting a general or remote local revulsion. And the medicines employed for this purpose have been cantharides, ammonia, ether, camphor, and oil of amber. The following formula may be tried with some prospect of advantage.

Take of Tartarized Antimony ℈ij
" Tincture of Cantharides ℥j
" Rose water - - ℥vj

Dissolve the antimony in the rose water, then add the tincture and make the embrocation. Another Take of soap liniment ℥iss,
" Oil of Amber — ℥ss. Mix. They should be applied not only to the chest, but along the course of the spine; the milder ones may be repeated frequently during the day. In addition to those stimulants above mentioned, garlic and turpentine have been found useful as irritants to the surface. After all, perhaps the best antispasmodics are

tonic medicines and tonic regimen. Dr Bellen trusts almost exclusively to the cinchona. "I consider," says he, "the use of this medicine as the most certain means of curing the disease in its second stage, and when there has been little fever present, and a sufficient quantity of the bark has been given, it has seldom failed of putting an end to the disease. It is used in Germany combined with the sulphuret of antimony. The oxid of zinc, and the arsenical solution of Fowler are also praised. Expectorant medicines, of several kinds, have been tried, and occasionally have proved singularly beneficial. Dr Richard Pierson has spoken in high terms of the combined influence of an expectorant, (the vinum ipecacuanha) with an anodyne and absorbent. He recommends this formula.

Take of pure water ℥j

Syrup — — ℥iij

Sub-carbonate of Soda grs xxv

Wine of Ipecacuan. ℥j

Laudanum — gtt vj. Mix. Take the sixth part of this every fourth or sixth hour.

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This will also be found a good formula.

Take of Elixir Paregoric ℥ss
Syrup of Squills — ℥j
Antimonial Wine — ℥ij
Water — — ℥vi

Mix. A teaspoonful to be taken occasionally to allay the cough. An open state of the bowels is almost essential to the favourable progress of the disease. An occasional dose of rhubarb in conjunction with an absorbent, is of decided advantage. It has been observed the fluid brought up by vomiting has a sour smell; attention to diet is often sufficient; roasted apples, stewed prunes &c. In the latter stages of hooping-cough, where it becomes combined with symptoms of marasmus, it will be found best to pursue the treatment of Egre on this disease, by small doses of calomel the $\frac{1}{6}$ or $\frac{1}{8}$th of a grain twice a day. In all severe cases, when the cough is accompanied with permanent dyspnoea, much heat of skin, and other febrile symptoms, general or local blood letting ought never be omitted. When the child complains of much headache, it will be found very

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necessary to apply a few leeches to the head. It has even been observed, that the severity of the hoop has been in this way diminished, and the acknowledged influence of certain states of the brain upon the respiratory organs may be adduced in explanation of the fact. When the disease proves very tedious and obstinate, resisting all the common modes of relief, and exhausting the patient by its continuance, we may fairly presume that it has rooted itself in the system by the force of habit; and to break in upon this, change of air has long been found eminently beneficial, especially where the difference of temperament, or even temperature, can be rendered very considerable, as from a low to a high atmosphere or from the interior of a country to the sea coast; Cold bathing has proved more certainly and rapidly remedial than any other prescription whatever; and particularly where it has never been made use of before, and hence introduces a new action into the system.

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